CITY OF FERDINAND
SOURCE WATER ASSESSMENT REPORT

November 8, 2000

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for Ferdinand, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The City of Ferdinand drinking water system consists of two wells, both of which are currently threatened by levels of nitrate contamination that are greater than 50 percent of the drinking water maximum contaminant level (MCL) for nitrate of 10 mg/l. Since 1985, nitrate levels have ranged between 5.6 mg/L and 10.5 mg/L with an average of 6.96 mg/L. Nitrogen isotope data collected during a ground water study in 1998 indicate that the source of nitrate in wells surrounding the City of Ferdinand is primarily due to the use of commercial fertilizer on crops. The dominant agricultural land use supports the likelihood of impacts from agricultural activities. Nitrogen isotope data from City Well #1 indicate the nitrate may be from a combination of sources including commercial fertilizer, animal or human wastes, or organic nitrogen from plant matter.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the City of Ferdinand, source water protection activities should focus on implementation of practices aimed at reducing the leaching of nitrate from land within the source water protection area. Most of the designated areas are outside the direct jurisdiction of the City of Ferdinand. Therefore, partnerships with state and local agricultural agencies and industry groups should be established to implement source water protection activities. Due to the time involved with the movement of groundwater, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission and local Soil Conservation District, the Natural Resources Conservation Service, and the Nez Perce Tribe.

A community with a fully developed source water protection program will incorporate many strategies. For assistance in developing protection strategies please contact your regional Idaho Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR FERDINAND, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is attached.

Level of Accuracy and Purpose of the Assessment

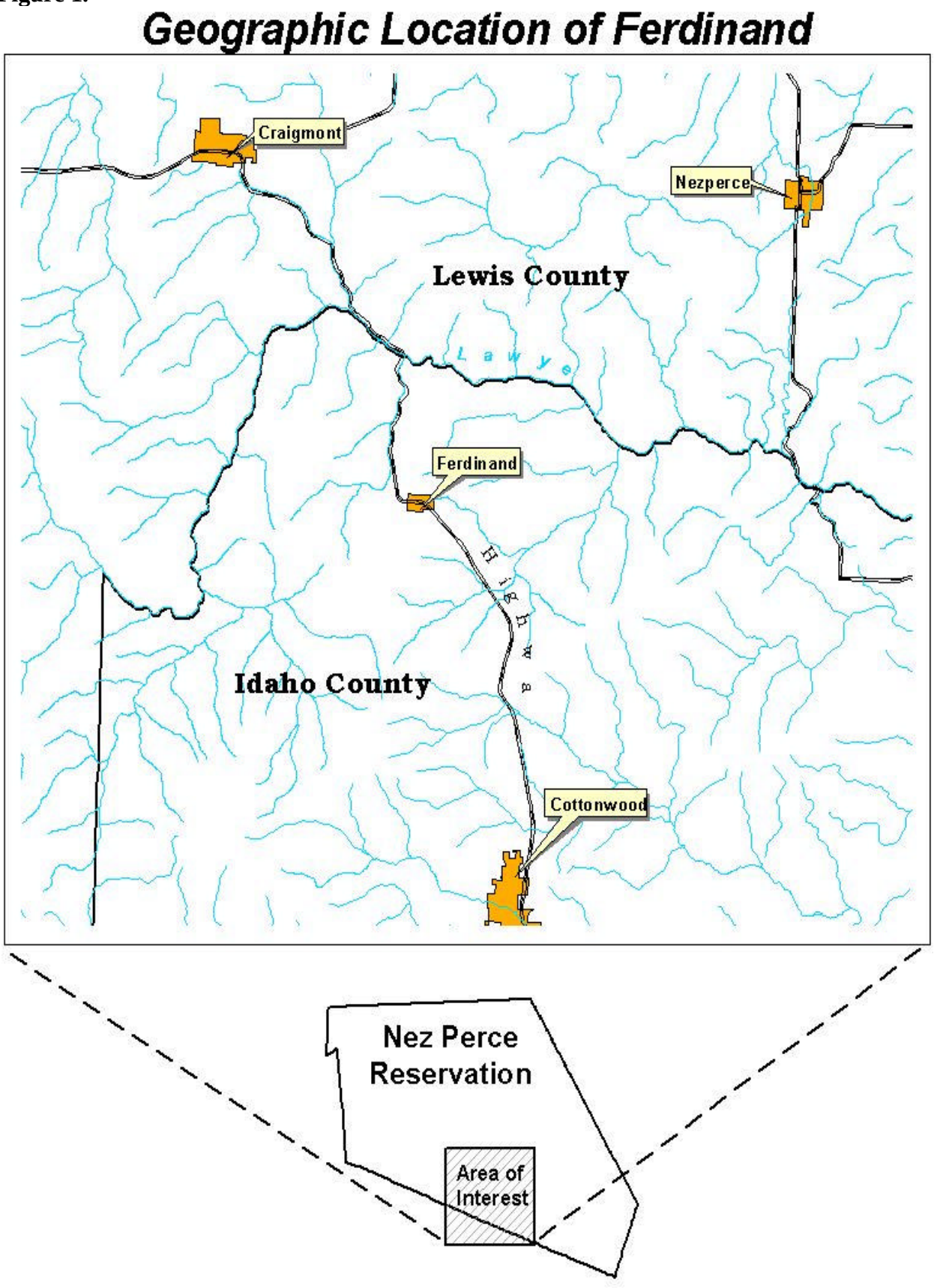
The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities so they can develop a protection strategy for their drinking water supply system. The DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

The City of Ferdinand is located in northwest Idaho County within the Nez Perce Tribe 1863 Treaty Boundary (Figure 1). The City of Ferdinand is a community of approximately 200 people that provides municipal drinking water systems and sewer systems to its residents. The public water system consists of two wells (Well #1 and Well #2-west) located within approximately 30 feet of each, on the north edge of the City. U.S. Highway 95 runs just east of town (the old route of U.S. Highway 95 is depicted on Figure 1) continuing on to Grangeville to the south and Lewiston to the north.

Figure 1.

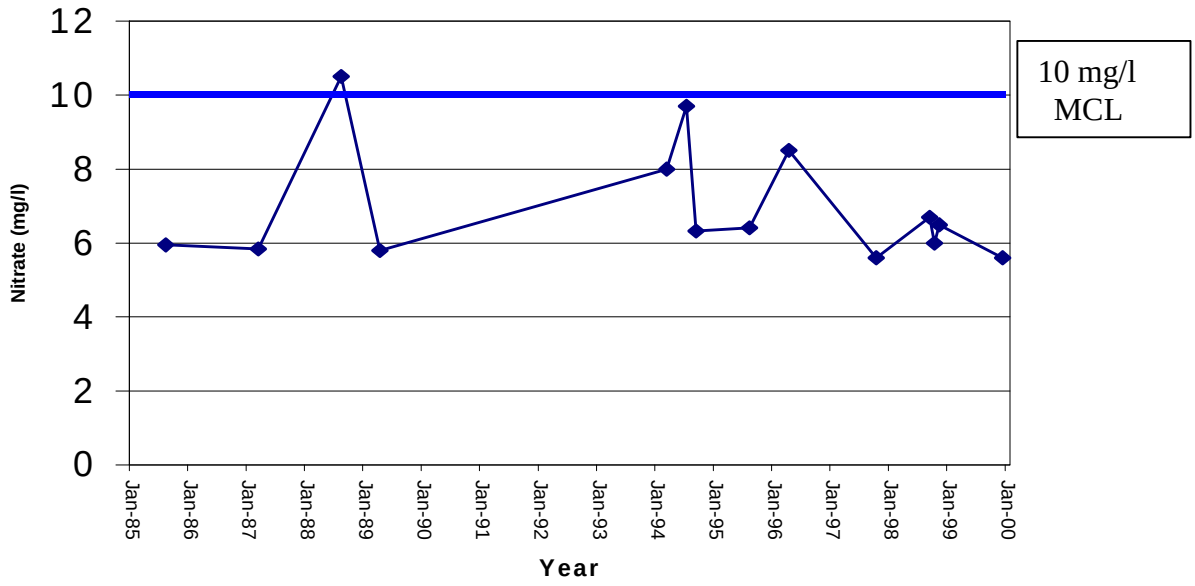

Geographic Location of Ferdinand
Craigmont
Nezperce
Lewis County
Lawyer
Ferdinand
Highway 8
Idaho County
Cottonwood
Nez Perce Reservation
Area of Interest

General Description of the Source Water Quality

The hydrology and water quality are not well documented in the Ferdinand area. Recent studies document areas of water quality problems however, a complete understanding of the hydrogeologic system of the area will require further study. The DEQ conducted a study during 1998 (*A Reconnaissance of Nitrite/Nitrate in Camas Prairie Ground Water [Bentz*, 1998]) evaluating the extent of nitrate contamination on the Camas Prairie. Ground water samples from 53 wells were collected during this regional investigation and analyzed for nitrate. The regional study indicated the groundwater in the Ferdinand area contained elevated nitrate levels. In anticipation of the source water assessment process, an evaluation of the ground water quality proximate to the City of Ferdinand source water protection area was conducted by DEQ in November 1998. Water samples were collected from six wells and two springs believed to be hydraulically upgradient of the City of Ferdinand and located near or within the City of Ferdinand source water protection area. The results of the investigation suggest that commercial fertilizer is a significant contributor to the elevated nitrate levels (DEQ, 2000).

The only water quality issue currently facing the City of Ferdinand public water system appears to be elevated levels of nitrate that have on one occasion in 1988 exceeded the drinking water MCL of 10 mg/l. Since that time nitrate levels have ranged from 5.6 mg/l to 9.7 mg/l and averaged 6.83 mg/l. Historic water quality data for the City of Ferdinand wells is shown on Figure 2.

Figure 2. Historical Nitrate Levels in Ferdinand Drinking Water System



Defining the Zones of Contribution--Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. The wellhead protection area for the City of Ferdinand is composed of four zones (IA, IB, II, and III). Zone IA, the sanitary setback zone, extends at least 50 feet from the well. The 3-year time of travel corresponds to Zone IB; the 6-year time of travel corresponds to Zone II; and the 10-year time of travel corresponds to Zone III. The outer boundaries of the zones represent the distance it takes water to travel to a specific well within a specific time period. For example, contaminated water at the outer 3-year time of travel boundary would take 3 years to travel to the well.

DEQ used a refined computer model developed for the EPA to determine the time of travel zones for ground water in the vicinity of City of Ferdinand, Idaho (Figure 3). The computer model used site specific data, assimilated by DEQ from a variety of sources including the driller's logs from the city well and surrounding wells. The data used by DEQ in determining the source water assessment delineation area are available upon request and are further summarized in the report entitled *Evaluation of Potential Nitrate Sources Impacting Drinking Water Quality, Ferdinand, Idaho* (DEQ, 2000).

The wellhead protection area zones are designed so that appropriate levels of management can be applied to contaminant sources within those zones. Typically more stringent management practices are applied to contaminant sources closer to the well and less stringent management practices are applied to contaminant sources further from the well. Ideally, all contaminant sources within a wellhead protection area should be managed in a manner to prevent contamination from reaching the water supply well.

The predominant geologic feature underlying the Ferdinand area is the Columbia River Basalt. Millions of years ago several basalt flows extruded from vents in what are now Oregon and Washington, resulting in a succession of faulted basalt layers (Castelin, 1976). These basalt flows did not extrude continuously, but were deposited such that weathering took place between flows. This weathering process produced interbeds of weathered material. As the basalt flowed out across what is now the Camas Prairie, it inundated much of the granite basement complex. A contact between the basalt and the granite is located just to the south of the City of Ferdinand and runs in a roughly southeast-northwest direction. A report prepared by Dr. John Bond for the City of Ferdinand (Bond, 1997) indicates that a transition zone between the basalt and granite underlies the City of Ferdinand. Wells within and surrounding the City of Ferdinand typically draw water from the shallow basalt aquifer. However, wells located to the south of the City appear to draw water from greater depths in a granite aquifer.

The geologic map and ground water flow data indicate the source of the drinking water supply for the City of Ferdinand moves through granite and basalt aquifers. These two rock types typically have very different hydrogeologic characteristics and would not generally be considered one aquifer. However, because the ground water appears to travel through both granite and basalt, the two aquifers are considered hydraulically connected. The resulting wellhead protection area may be described as a composite delineation, where the length is based on ground water flow in a basalt aquifer, while the width is representative of the hydrogeologic conditions typical of granite.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination. These involve educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Land use within the City of Ferdinand consists of residential homes, small businesses, an agricultural supply facility, and a concrete plant. Dry-land farming operations with small to medium sized farmsteads surround Ferdinand. Wheat is the predominant crop in the area with secondary crops including barley, peas, oats, canola, and alfalfa.

Contaminant Source Inventory Process

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination were obtained by field surveys conducted by DEQ and from available databases.

A two-phased contaminant inventory of the study area was conducted. The first phase involved identifying and documenting potential contaminant sources within the City of Ferdinand Source Water Assessment Area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second or enhanced phase of the contaminant inventory involved conducting an on-the-ground identification of potential sources and validation of sources identified in phase one. Brandon Bentz of the DEQ Lewiston Regional Office conducted the enhanced inventory with the assistance of Mr. Ron Riener, City of Ferdinand Water System Operator. In September, 2000 Mr. Lance Holloway with the Idaho Association of Soil Conservation Districts, and Mr. Paul Schmidt, the Mayor of Ferdinand, identified additional potential contaminant sources.

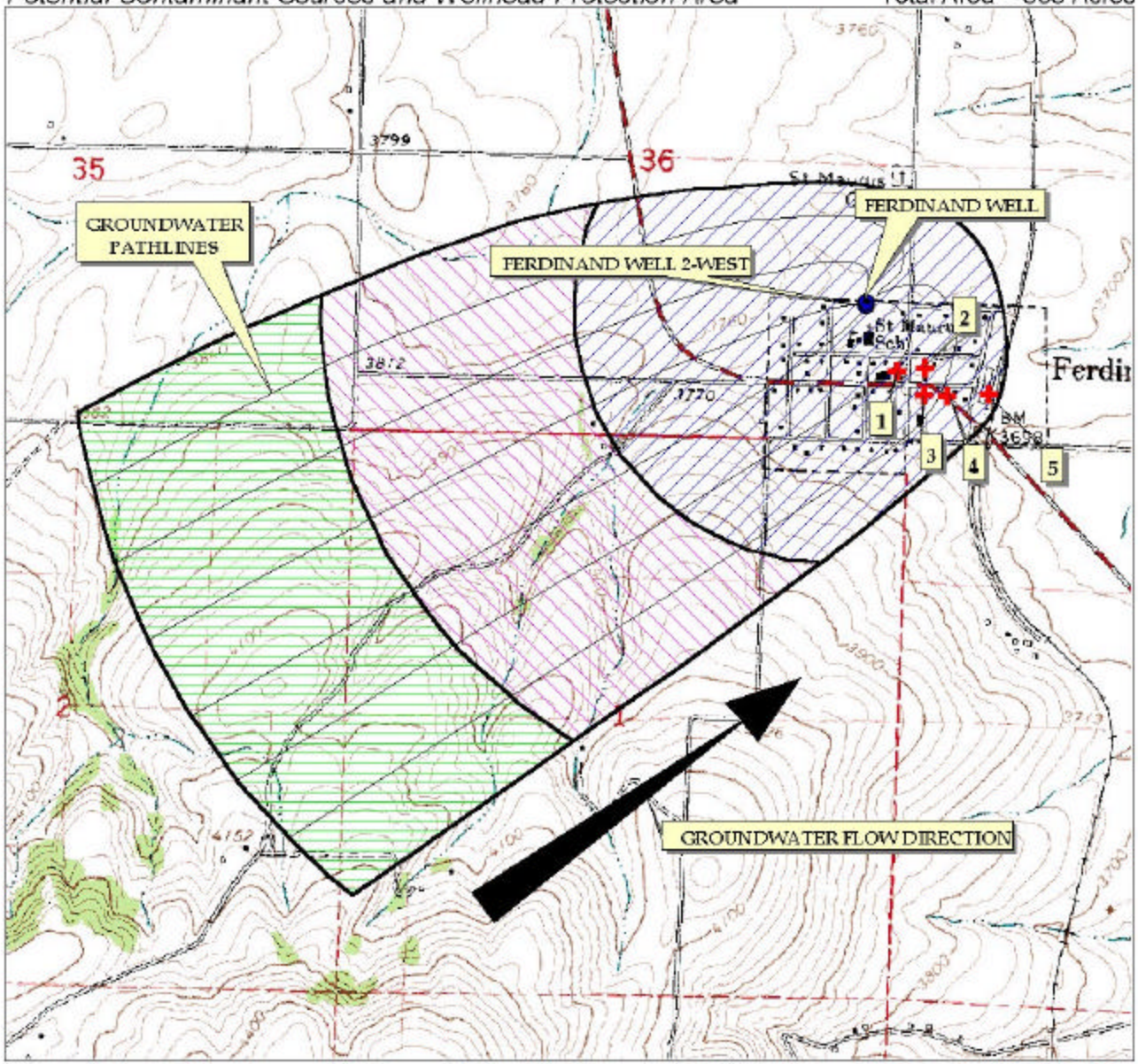
Section 3. Susceptibility Analyses

The susceptibility of the wells to contamination was ranked as high or moderate risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Figure 3.

Ferdinand, Idaho

Potential Contaminant Sources and Wellhead Protection Area Total Area = 838 Acres



LEGEND

- Wellhead
- Enhanced Inventory
- Toxic Release Inventory
- RICRIS Site
- Dairy
- CERCLIS Site
- Business Mailing List
- NPDES Site
- SARA Title III Site (EPCRA)
- Mine
- Closed UST Site
- Open UST Site
- LUST Site
- AST
- Wastewater Land App Site
- Landfill

Time of Travel Zones

- 3 Year
- 6 Year
- 10 Year

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

Potential Contaminant Sources and Land Use

Five potential contaminant sites are located within the delineated source water area (see Table 1). Potential contaminant sources located in the delineated source water areas within the City of Ferdinand include: a large agricultural supply facility that distributes a wide variety of agricultural chemicals and fuels, a concrete batch plant, a closed service station, and a county highway district facility (Figure 3). The agricultural lands are located outside the City of Ferdinand.

Contaminants of concern are primarily chemicals such as petroleum products, solvents, and degreasers (VOCs), pesticides (SOCs) and commercial nitrogen fertilizers (IOCs). Table 1 lists the potential contaminants of concern, information source, and time of travel zone for each potential contaminant source. Potential sources of nitrate contamination in the Ferdinand area include potential leaking sewer systems, commercial nitrogen fertilizer and pesticides applied to agricultural and urban land, and a facility that distributes fertilizer and pesticides

The agricultural supply facility (Site #5) appears to be the most significant potential source of contamination located within the wellhead protection area with regards to variety and quantity of contaminants stored on site. At this site they store and distribute agricultural chemicals including fuel, insecticides, herbicides, and fertilizers.

Table 1. Ferdinand Potential Contaminant Inventory

SITE #	TYPE OF FACILITY	Source of Information	Potential Contaminants	Wellhead Protection Zone location
1	Concrete/Crushing Business	Enhanced	VOCs, IOCs	**0-3 year**
2	Concrete/Crushing Business	Enhanced	VOCs, IOCs	**0-3 year**
3	Highway district facility	Enhanced	SOCs, VOCs, IOCs	**0-3 year**
4	Historic Gas Station	Enhanced	VOCs	**0-3 year**
5	Ag-Chemical/Grain Storage	Enhanced and Database	SOCs, VOCs, IOCs	**0-3 year**

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Hydrologic Sensitivity

Hydrologic sensitivity was uniformly high for both wells (see Table 2). This reflects the high permeability of the soil, the shallow nature of the basalt ground water system (less than 300 feet to water), and the lack of 50 feet of fine-grained layers. These factors are important because they influence how easily contaminants reach the aquifer.

Well Construction

The construction of the City of Ferdinand public water system wells directly affects the ability of the wells to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. The City of Ferdinand drinking water system consists of two wells that extract ground water for domestic

and industrial uses. The well system construction score for Well #1 was moderate while the score for Well #2 was low. Two of the system construction criteria are different between the wells. Well #1 does not meet current IDWR construction standards because the well casing is thinner than the minimum requirements. Also, the production interval of Well #1 is not 100 feet below the static water level. Well #2 meets current construction standards and draws water from more than 100 feet below the water table.

Table 2. Selected Construction Characteristics of City of Ferdinand Wells.

Well #	Total Depth (ft.)	Screened Interval (ft.)	Depth of Surface Seal (ft.)
1	242	142-202	32
2	250	Open hole 184-250	184

Susceptibility Summary

The susceptibility analysis indicates that the City of Ferdinand wells have slightly different susceptibilities. Well #1 received an automatic HIGH susceptibility in the IOC category for nitrate because it was measured in the water system at a level above the MCL in 1988, and because agricultural land is within Zone IA – the sanitary setback zone. Agricultural land is considered a source of nitrate due to the nitrate in commercial fertilizer. The susceptibility analysis also rated the well as having a HIGH susceptibility to inorganic contamination due to potential sources of nitrate and well construction deficiencies. The susceptibility analysis rated the well as having MODERATE susceptibility for VOCs, SOCs, and microbial contamination.

Well #2 rated MODERATE for all contaminant categories. The susceptibility analysis rated Well #2 slightly less susceptible to contamination than Well #1 because potential contaminant sources are not present within Zone 1A for Well #2.

Table 3. Summary of City of Ferdinand Susceptibility Evaluation

Well	**Susceptibility Scores**									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
1	H	H	M	M	M	M	H*	M	M	M
2	H	H	M	M	M	L	M	M	M	M

H = High Susceptibility, M = Moderate Susceptibility, L=Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* - Indicates source automatically scored as high due to and MCL violation and the presence of a potential contaminant source within 50 feet of well.

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

A recent ground water quality investigation in the Ferdinand area indicates the source of nitrate in the area is primarily due to commercial fertilizer. This information can help the community develop a source water protection program tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. For Ferdinand, source water protection activities should focus on implementation of practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the delineated source water areas. Most of the delineated areas are outside the direct jurisdiction of Ferdinand. Partnerships with tribal, state, and local governments and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho Department of Agriculture, the Soil Conservation Commission and local Soil Conservation District, the Natural Resource Conservation Service, and the Nez Perce Tribe.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office (208) 799-4370

State DEQ Office in Boise (208) 372-0502

Website: http://www2.state.id.us/deq

Water suppliers serving few than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at (208) 743-6142 for assistance with wellhead protection strategies.

Additional assistance may be available from the Idaho Association of Soil Conservation Districts at (208) 338-4321.

References Cited

Bentz, B., 1998, *A Reconnaissance of Nitrite/Nitrate in Camas Prairie Ground Water, Lewis and Idaho County,* Idaho Division of Environmental Quality.

Bond, J.G., 1997, Memorandum to Walter Steed:, Subject: "New-well site for Ferdinand," March 3, 1997.

Castelin, P.M., 1976, *Reconnaissance of the Water Resources of the Clearwater Plateau, Nez Perce, Lewis and Northern Idaho Counties*, Idaho, Idaho Department of Water Resources, Water Information Bulletin No. 41.

Idaho Department of Environmental Quality, 2000, *Ground Water Quality Investigation and Wellhead Protection Study, Ferdinand, Idaho*, Ground Water Quality Technical Report No. 15.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Attachment A
City of Ferdinand
Susceptibility Analysis
Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report — Public Water System Name : FERDINAND CITY OF — Well# : WELL 2-WEST
Public Water System Number 2250019 — 11/8/00 10:00:16 AM

1. System Construction			SCORE			
Drill Date		9/25/98				
Driller Log Available		YES				
Sanitary Survey (if yes, indicate date of last survey)		YES	2000			
Well meets IDWR construction standards		YES	0			
Wellhead and surface seal maintained		YES	0			
Casing and annular seal extend to low permeability unit		YES	0			
Highest production 100 feet below static water level		YES	0			
Well located outside the 100 year flood plain		YES	0			
Total System Construction Score			0			
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained		NO	2			
Vadose zone composed of gravel, fractured rock or unknown		YES	1			
Depth to first water > 300 feet		NO	1			
Aquitard present with > 50 feet cumulative thickness		NO	2			
Total Hydrologic Score			6			
3. Potential Contaminant / Land Use - ZONE 1A			IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A		DRYLAND AGRICULTURE	1	1	1	1
Farm chemical use high		YES	2	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A		NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A			3	1	1	1
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)		YES	3	4	2	0
(Score = # Sources X 2) 8 Points Maximum			6	8	4	0
Sources of Class II or III leacheable contaminants or		YES	4	4	2	
4 Points Maximum			4	4	2	
Zone 1B contains or intercepts a Group 1 Area		YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural		2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B			14	14	8	2
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present		NO	0	0	0	
Sources of Class II or III leacheable contaminants or		YES	1	0	0	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural		1	1	1	
Potential Contaminant Source / Land Use Score - Zone II			2	1	1	0
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present		YES	1	0	0	
Sources of Class II or III leacheable contaminants or		YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of		NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III			2	0	0	0
Cumulative Potential Contaminant / Land Use Score			21	16	10	3
4. Final Susceptibility Source Score			10	9	8	7
5. Final Well Ranking			Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report Public Water System Name : FERDINAND CITY OF Well# : WELL
Public Water System Number 2250019 11/8/00 10:00:16 AM

1. System Construction		SCORE				
Drill Date	5/2/73					
Driller Log Available	YES					
Sanitary Survey (if yes, indicate date of last survey)	YES	2000				
Well meets IDWR construction standards	NO	1				
Wellhead and surface seal maintained	NO	1				
Casing and annular seal extend to low permeability unit	YES	0				
Highest production 100 feet below static water level	NO	1				
Well located outside the 100 year flood plain	YES	0				
Total System Construction Score		3				
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained	NO	2				
Vadose zone composed of gravel, fractured rock or unknown	YES	1				
Depth to first water > 300 feet	NO	1				
Aquitard present with > 50 feet cumulative thickness	NO	2				
Total Hydrologic Score		6				
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score	
Land Use Zone 1A	DRYLAND AGRICULTURE	1	1	1	1	
Farm chemical use high	NO	0	0	0		
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	YES	NO	
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	1	1	
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)	YES	3	4	2	0	
(Score = # Sources X 2) 8 Points Maximum		6	8	4	0	
Sources of Class II or III leacheable contaminants or	YES	4	4	2		
4 Points Maximum		4	4	2		
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0	
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2	
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	14	8	2	
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present	NO	0	0	0		
Sources of Class II or III leacheable contaminants or	YES	1	0	0		
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1		
Potential Contaminant Source / Land Use Score - Zone II		2	1	1	0	
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present	YES	1	0	0		
Sources of Class II or III leacheable contaminants or	YES	1	0	0		
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0		
Total Potential Contaminant Source / Land Use Score - Zone III		2	0	0	0	
Cumulative Potential Contaminant / Land Use Score		19	16	10	3	
4. Final Susceptibility Source Score		13	12	11	10	
5. Final Well Ranking		High	Moderate	Moderate	Moderate	